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## CASES

OF

# RUPTURE OF THE URINARY BLADDER, WITH REMARKS.

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CONSIDERING that rupture of the bladder is not an extremely rare occurrence, there are very few cases of it on record. The reason has been supposed to be an unwillingness on the part of surgeons to publish cases so frequently terminating in death, notwithstanding their best efforts to preserve the patients alive. The great fatality of this lesion ought, however, only to increase the interest with which cases of it should be studied, while the opportunities thus afforded of obtaining, by inspection after death, exact information regarding the nature of the injury sustained during life, ought to be the more fully and anxiously improved.

Such cases are not, on the other hand, so frequent in their occurrence, that the experience of any one man can be sufficient to establish on a firm basis the pathology, prognosis, or treatment of this grave injury, either for his own guidance or that of other practitioners. Such a happy result can only accrue from a careful induction of numerous and well-observed cases. Nor do we know of any better source from which to derive the required data than are the records of the Glasgow Royal Infirmary, which, from its position in the midst of a populous mineral and manufacturing country, receives into its wards the subjects of more numerous and severe accidents than any other hospital in the kingdom.

The following cases occurred during my residence in the Infirmary as house-surgeon. They are given in nearly the same words in which they were originally inserted by myself in the hospital journals :—

CASE I.—William M'Culloch, aged thirty-two, a carter, was admitted into No. 11 Ward of the Glasgow Royal Infirmary, on the evening of August 13, 1844.



Three days before his admission, when the patient was in the act of leaping from a cart, which was the foremost of a line of several, his foot slipped, and he fell to the ground upon his back. While in this position, the wheels of three waggons passed between his legs, and over his left groin and thigh. His chief complaint, after the accident, was of pain in the perineum and above the pubis, with a constant desire but complete inability to pass his urine. The treatment consisted of bleeding from the arm, and by leeches to the parts affected. His bowels were freely moved by medicine.

On his admission, he still complained of pain in the perineum; his countenance was anxious, and his respiration rapid; pulse 113, feeble.

There was livid ecchymosis of the skin on the inside of the left thigh and groin, as also of the scrotum and penis. The cellular tissue of the upper part of the thigh, scrotum, and perineum, especially its left side, were much swollen, and communicated such a sensation as if the parts mentioned were distended with air and fluid. It was not at this time judged prudent to make such an examination as could enable us to detect fracture of the pelvis; but this being strongly suspected, perfect repose in the easiest position was enjoined, fomentations were assiduously applied to the injured parts, a Dover's powder was given, and wine was cautiously administered. The catheter was introduced with ease, and apparently into the bladder. A considerable quantity of bloody foetid urine flowed by it, and the patient felt much relieved.

Next day this state was much the same, but easier, on account of the frequent introduction of the catheter, by which a very little urine was on each occasion allowed to trickle away. A free incision was made by the late Dr Hannay, then surgeon to the hospital, on the left side of the raphe, and at the anterior part of the perineum. Thirty-two ounces of fluid, which had a strong urinous odour, were thus evacuated; and, when the finger was introduced into the wound, the ramus of the pubis could be felt fractured about its middle. The patient is reported to have experienced much relief on the evacuation of this urinous fluid. Pulse still continued quick and feeble, and his other symptoms indicated much general prostration. It is also reported that the sensibility of the lower extremities remained unimpaired.

He was ordered 12 oz. of wine and 1 lb. of beef-tea in the day, and to have camphor and opium thrice in the twenty-four hours.

On the 15th the hospital report is as follows:—"Urine flows freely by the wound. Feels and looks relieved. Ends of bone (*viz.*, of pubis, felt through the wound) at a distance from one another, and distinctly moveable. Tongue clean and moist. Pulse 90, improved in strength. Natural movement of bowels. Patient can raise lower part of body in bed. He relishes his wine, has some appetite, and does not vomit."

Next day he was ordered six ounces of whisky, instead of his wine; but there is no report until the 24th, when it is said that "patient has had several rigors, followed by heat of skin. Pulse rapid, small, and weak. Complains of thirst and of weakness only. Bowels free; tongue moist, and slightly white. Urine flows freely by the wound, and a considerable extent of the ischium is exposed, by sloughing of the cellular tissue."

Dover's powder at night was substituted for the camphor and opium.

Next day (25th) it is reported that there is extensive sloughing of perineum and over sacrum; but that, in other respects, the patient is not worse.

27th. Debility and exhaustion increase. Respirations 40 per minute. Pulse scarcely to be felt, and tremulous.

He died next morning.

29th. *On inspection*, much effused blood was found beneath the pelvic fascia, and in the folds of the mesocolon and mesorectum. The bladder was found ruptured obliquely through the left side of its neck, and below the reflexion of the peritoneum, which constitutes its lateral false ligaments. The coats of the bladder were thickened and inflamed. The rupture was a clean rent through both coats, and admitted three fingers. It opened into what appeared



a large abscess, stretching up behind the bladder and between it and the sacrum. The incision had been made into this cavity. The urethra was sound and uninjured throughout its entire length.

The left sacro-iliac synchondrosis was completely separated, and the left side of the body of the pubis was fractured close to the symphysis. The left ramus of the pubis and ischium was also fractured, and the fracture extended into the acetabulum. The tuberosity of the ischium was completely separated from the body of the bone. The cavity of the left acetabulum contained a quantity of purulent matter, and its lining membrane presented the usual appearances of high inflammation.

On the right side of the pelvis the only injury was an oblique fracture of the ramus of the pubis, without any displacement.

At the lower margin of the right lobe of the liver there was a small deposit of purulent matter. Other organs were quite healthy.

CASE II.—George Bell, aged twenty-seven, an engineer, was admitted into ward No. 11 of the Glasgow Royal Infirmary, on the 14th March 1846, at nine and a half P.M. (Dr A. Buchanan was at this time surgeon to the hospital.) Half an hour before his admission the patient was at work beside the steam-engine which he had charge of, when his left foot was caught by the fly-wheel, and he was drawn in among the machinery. The foot passed between two spokes, and the whole force of the revolving wheel came upon his leg, which was pressed against the belt, and the engine thus stopped. But before that was effected his right leg had been twisted upwards, and he had received a violent blow at the lower part of his back from the main shaft of the engine.

On examination it was found that the patient had suffered a severe compound fracture of both bones of the left leg; which was immediately attended to.

He complained much of pain at the right sacro-iliac synchondrosis, especially when the limb of that side was moved, and, with the exception of being able to draw up the leg a little, he had no power of moving it. The posterior part of the right ilium was felt to project more than that of the other side, and it was more moveable on the sacrum, which seemed at a relatively greater depth from the surface of the back. In short, there appeared to be displacement of the sacrum forwards, and of the ilium backwards, on the right side.

Patient had an uneasy and ineffectual desire to micturate. Some bloody urine was drawn off by the catheter. His face and surface generally were pale and cold. Pulse quick and feeble.

He had been in perfect health up to the time of the accident.

Next day the patient was still very uneasy, and evidently feebler. He was unable to micturate by voluntary effort, but felt much relieved by the frequent introduction of the catheter; on which occasions small quantities of slightly bloody urine were usually evacuated.

The evident indications of supporting the failing strength, and allaying the sufferings of the patient, were attended to, but without avail, for next morning he was found sinking fast, and he expired at six P.M.

17th.—On inspection of the fractured leg, it was ascertained that the posterior tibial artery was sound, but that the peroneal was ruptured.

On examining the abdomen, the bladder was found ruptured at its fundus, so as to admit three or four fingers. The rupture was transverse, *i. e.*, nearly parallel to the transverse diameter of the pelvis, and its edges were clean. A very small quantity of urine was found in the peritoneum; of which that part which lines the pelvis was much injected. A large quantity of blood was effused into the interior of the pelvis, and into the substance of the muscles at the lower part of the abdomen, as well as between them and the peritoneum. The other abdominal organs were healthy.

The right ilium was quite separated from the sacrum at the synchondrosis, and the pubic ligaments were also ruptured, so that the os innominatum was thus completely detached from the rest of the pelvis.



The first point of interest in these cases is the mechanical cause of the rupture in the coats of the bladder.

Dr Harrison, in his excellent paper "On Rupture of the Bladder," contained in the 9th volume of the *Dublin Medical Journal*, (page 349), states two causes of this lesion, to which he refers all recorded cases of it. His words are, "every case on record has been the result, either of some force directly applied against the abdomen, such as a blow or fall against some resisting body, or of a fall from a height, causing a general concussion of the whole frame." We think it will not be difficult to show that the cases which have just been read, resulted from neither of these two causes; and it will be equally easy to point out a different, but a very obvious and sufficient, cause for the lesions sustained.

In the first of them the force was not applied directly against the abdomen, but across the groin; neither does it seem that the bladder was ruptured by the general concussion, which, no doubt, was caused by the fall from the cart; for in all recorded cases of this last-mentioned kind, viz., those in which rupture has resulted from "a general concussion of the whole frame," the seat of the rupture is at the base of the bladder. This happens because, first, the base is the least distensible part of the organ, it being covered with peritoneum: and second, because the urine, which in these cases is the efficient cause of the rupture, is driven, by the impulse communicated to it, against the neck of the bladder and pubic bones, is by them resisted and made to recoil against the base, where it operates, if the force be sufficient, by rupturing first the peritoneal, and then the other coats of the viscus. But the situation of the rupture in the case under consideration, was very different. It was in the neck of the bladder, and at that part of it, too, which exactly corresponded in position, extent, and direction, to the loosened part of the pubic bone. It ought to be remembered that the body of the pubis was completely fractured a little to the left of the symphysis, and that the corresponding ramus of the pubis and ischium was also fractured. This piece of bone, then, which corresponded so exactly with the rent in the bladder, was completely severed from its bony connexions, and might easily be, as we think it was, driven in upon the distended bladder. From a consideration, moreover, of the manner in which the external force was applied, and from the directions of the other fractures of the pelvis, formerly detailed, it will be readily perceived that a continuation, or, as really happened to this poor man, a repetition of the original force was quite capable, nay, most likely, to bear this fractured piece of bone against the part in which the rupture of the bladder was found after death. In explanation of the important bearing of these observations on the case in point, we need only refer to the history of it previously given.

In the second case, that of George Bell, the force which caused the rupture acted from behind. It is somewhat difficult, however,



to determine precisely how the blow operated, whether by producing a general concussion of the whole frame, or by causing the bones to impinge directly on the base of the bladder. We think, however, that the nature of the accident and its obvious effects, sufficiently prove the latter supposition to be correct. It will be remembered that the hour at which the accident happened was late in the evening, when the man was about to quit his work for the day, and very probably he had allowed his urine to accumulate in the bladder for some time previously. It is not too much then, we think, to assume that the bladder was fully distended, when the man received the blow from the main shaft of the engine. This blow immediately detached the ilium from the sacrum on the right side, and ruptured the pubic ligaments, thus separating the os innominatum from the rest of the pelvis. Nor was the force of the blow exhausted in producing this separation; for the right margin of the sacrum was at the same time pressed forwards—a position which, owing to the nature of its other connexions, it retained even after death; thus indicating, with perfect certainty, the minimum extent of the indentation. Even apart, therefore, from a consideration of the violence of the blow, and the natural elasticity of the parts, such a change in the bony pelvis as was found after death, was amply sufficient to prove that the sacrum and the margin of the ilium had been brought into direct and violent contact with the base of the distended bladder. There is, however, reason to think, that had this blow been the immediately efficient cause of the rupture, the rent in the bladder would have corresponded with the direction of the synchondrosis, and would not have been transverse. There seems to have been another link then in the sequence of events; and the history of the accident probably was, that the blow of the main shaft drove in the bones at the right synchondrosis against the base of the distended bladder, and that thus the violent impulse was communicated to the urine, which, by its rebound, produced the lesion in question.

In both of these cases, the accident was of a very severe kind, and the nervous shock proportionately great; but the progress of the cases was by no means such as it would have been had the bladder remained entire. The prominent symptoms in both cases were those occasioned by the lesions of the bladder; and yet their character and course were materially different.

As regards the case of the man M'Culloch, we, unfortunately, cannot speak with precision of the state into which he was immediately thrown by the accident, seeing that he was not admitted into the hospital until three days thereafter. But, judging from the severe antiphlogistic treatment which he appears to have required, and to have borne, his state must have been one much more acutely inflammatory than that of George Bell. The latter, indeed, never recovered from the nervous prostration caused by the effusion of urine into the peritoneum, combined with the shock of the accident.



The latter, although severe, would not, we think, have been adequate to the effect produced, had not the former concurred with it. The patient in this case lived forty-five hours, and expired without exhibiting the slightest symptom of reaction. Such a termination of the case will not astonish any one, however, who remembers the effect of a foreign fluid in the peritoneum, especially when of an irritating nature, and suddenly introduced, as was the urine in this instance.

M'Culloch, the subject of the other case, lived for eighteen days after the accident. The "shock" which he received at first, was not indeed so severe as that under which the other man sunk, but the injury to the pelvis was much greater. The true explanation of the great difference in this respect between these two cases, is to be found in the fact, that in the latter the urine was not, as in the former, discharged into the peritoneum, but into the muscles beneath it. Inflammation, suppuration, and sloughing ensued; the tendency being towards a natural cure by external opening of the abscess. This effort of nature was duly aided by surgical interference; and there is little doubt in my mind, that this patient would have ultimately recovered, had he not fallen a victim to that mysterious disease phlebitis, which was then prevalent in the hospital. The commencement of this disease in M'Culloch's case, is noted in the report of the 24th, up to which time he had gone on improving. Consequently, at the inspection, it was found that one of those peculiar purulent deposits, characteristic of that disease, existed in the right lobe of the liver, and that a quantity of matter was contained in the left acetabulum. This case, then, is in many respects similar to that of the child Nicholas Keog, recorded by Dr Harrison in the paper formerly referred to. Regarding this case, Dr H. remarks, that he thinks it might have been saved, had he sufficiently early used free incisions, so as to admit of the escape of the urine, and thus to check the diffuse gangrenous inflammation of which the child ultimately died. In his *Pathology and Practice of Surgery*, Mr Syme has lately recorded an interesting case of rupture of the neck of the bladder, from direct violence applied above the pubis, and without fracture of the pelvis. The skin was freely incised in the place indicated, the patient's strength was supported, and after a critical illness he recovered in about six weeks. This, we believe, is one of the only two cases on record, of recovery from rupture of the bladder. The true principle of prognosis in these cases, has been laid down by the same high authority, that "if the rupture takes place above or within the reflexion of the peritoneum, there cannot be the slightest chance of escape. But if the rent is at the anterior part, so as to discharge the contents of the bladder by a sudden gush into the cellular substance, and condense it in such a way that only the portion in contact with the urine may be deprived of life, it appears that the patient may be saved by timely incisions." This latter observation is equally ap-



plicable to such cases as that of M'Culloch, formerly related;—the only difference being in the position of the rupture, viz.—in the side rather than in the front of the neck of the bladder. Mr Syme, in penning the remark, obviously referred to cases similar to his own, in which no fracture of the pelvis existed; and, in these circumstances, the only part of the bladder which could suffer rupture without involving the peritoneum, is the anterior part of its neck. But in cases of fracture of the pelvis, a large portion of the sides, and of the inferior part of the bladder, is liable to rupture, while the peritoneum may not be injured.

In regard to treatment as well as to prognosis, cases of rupture of the bladder are divisible into two classes, viz., those within and those without the peritoneal sac. The great feature of treatment in the former class of cases is, incision for the relief of the extravasation, which is the immediate consequence of such ruptures. In all cases of this kind there will be some external mark of the phenomenon in question—such mark will be afforded by swelling, as in Mr Syme's case, or of that combined with crackling, as in the first of the two cases related in this paper. It is extremely unlikely that any such mark should be present if the bladder were ruptured within the peritoneum; for in that case extravasation would be prevented by the peritoneum; and, owing to the nature of the causes which generally operate in the production of such injuries, no apparent phenomenon may indicate rupture of the bladder. A blow on the vesical region of the abdomen may be sufficient to produce this lesion, and yet no mark of violence may be visible on the skin; a circumstance which is remarkable in all abdominal injuries. In general concussions of the whole frame, on the other hand, the external marks of injury may be at a considerable distance from the seat of the most important lesion. It is fortunate, however, that in such cases, viz., those in which there is no external mark to direct the surgeon in making his incisions, the situation of the rupture being most likely within the peritoneum, there is no hope of relief from such practice.

The question now naturally occurs, What is the treatment proper for intra-peritoneal rupture of the bladder? or, Is there none? Dr Harrison recommends tapping of the peritoneum from the rectum; but the operation has not been tried. Certainly, if such an operation is to be at all successful, that must be the situation of the opening into the peritoneum. There could be no expectation of benefit from paracentesis in the usual place, where it was performed in two fatal cases of this kind, mentioned by Dr Harrison. This practice seems to me well worth trying in all such cases, in which the bladder is reported to have been much distended at the time of the accident. It can add nothing to the danger of the patient, and seems to give him the only chance of life. This opinion is strongly corroborated by an interesting provision of nature which has been found to occur in some of these cases, such as Gibson's



case, related by Dr Harrison, and another mentioned by Dupuytren in the *Archives Générales* for June 1834. In both of these cases the lymph thrown out by the peritoneum had formed a pouch or secondary reservoir for the urine, by agglutinating the intestines and the fundus of the bladder itself to the walls of the abdomen, thus shutting out the pelvic cavity from the rest of the abdomen. Now, in these cases, if there had been some outlet for the urine, the inflammation would, in all probability, have subsided, and the men would have recovered. In other instances, however, a small quantity of urine having been at first effused, it seems to be rapidly absorbed in the early stage of the inflammation which it occasions. In these cases, then, no good could be done by operative interference of the kind alluded to. The *secretion* of the urine seems in them to be all but suspended, and therefore the passage of that fluid from its natural reservoir would not be sufficient to call for such procedure.

The difficulty of diagnosing between these two sets of cases, is often extreme: but perhaps the absence of every symptom except those of rapid failure of the vital energies, contrasts sufficiently with the phenomena, more or less apparent, of acute peritonitis, to enable the observer to distinguish, in most instances, those in which there is much from those in which there is little urine effused into the peritoneum. In the latter class of cases, the ordinary constitutional treatment of acute peritonitis—venesection, if the patient is seen in time, the free administration of calomel, opiates, and warm water enemata, with fomentations to the abdomen and complete rest—must be relied upon alone: nor ought such means to be neglected in the former class of cases, whatever else may be done for the patient. It is but too likely, from the nature of these cases, that if the patient live long enough stimulants may be proper; but they should be given with great care, and watchfulness as to their effects. In all such cases the anxiety of the surgeon will naturally be directed to the prevention of the accumulation of the urine in the bladder, which, if it did occur, even in a small measure, might endanger a new effusion of urine into the abdomen. This indication will be fulfilled, so far as possible, by the frequent introduction of the catheter, or, if the patient bear it well, by leaving a gum catheter in the urethra, care being taken not to push it beyond the neck of the bladder, lest, by adding a new cause of irritation, the existing inflammation be increased or renewed.